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## Circular No. 72 - Brooding and Feeding Chicks

Byron Alder

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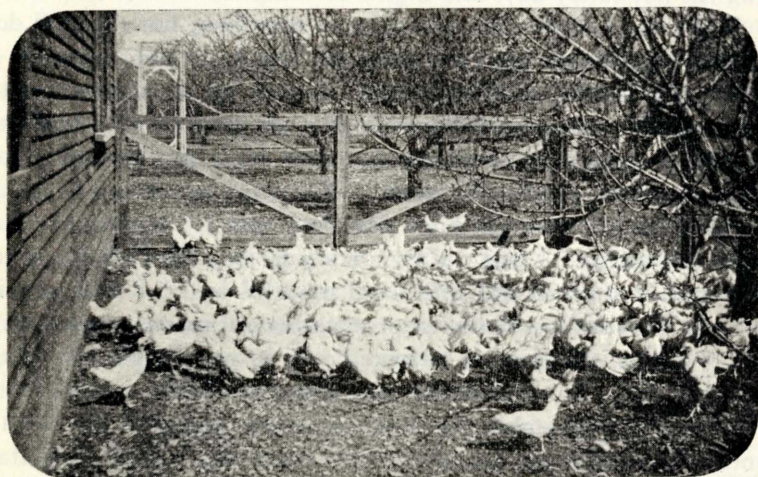


CIRCULAR 72 (Revision of Circular 50)

APRIL, 1928.

# Brooding and Feeding Chicks

By BYRON ALDER



## UTAH AGRICULTURAL EXPERIMENT STATION

LOGAN, UTAH

## BROODING AND FEEDING CHICKS

By Byron Alder\*

The poultry raiser who does not plan and lay the foundation for a better flock each year is missing an opportunity to increase his financial returns and to make each year's poultry crop more secure. Under present conditions the profit made by a flock of hens is usually in direct proportion to the fall and winter egg production of the flock. Production during this period depends very largely on the success of the poultry raiser in developing each year's flock of pullets into strong, vigorous, mature birds. In other words, the number of eggs produced, the size of the eggs (within certain limits), and the profit made from a flock of hens are determined to a great extent by the care of the chicks during the brooding period and of the growing pullets during the hot sultry days and nights of summer.

The loss of chicks each year is most appalling, but this loss does not begin to represent the total economic loss from poor methods of brooding and feeding growing pullets. In any lot of chicks where the losses are heavy, many pullets survive that are permanently weakened or handicapped to such an extent that they never develop into good, thrifty, vigorous, productive birds. They are put into the laying quarters in the fall with the hope that they may yet develop into fair or good producers. These pullets are sooner or later culled out and sent to market with several additional months' feed bill still unpaid. The direct financial loss due to poor methods of brooding and feeding growing pullets, therefore, is measured only in part by the loss of the chicks that die. In view of the fact that the various causes of this loss are largely preventable, this loss is a serious blight on the poultry business. Whenever the loss of chicks is more than a small percentage of the total lot it is because some blunders have been made.

Some of the more common causes of heavy loss are:

- (1) Poor methods of brooding caused by over-crowding, chilling, overheating, dirty unsanitary disease-infected brooder houses and runs; bad ventilation; and inadequate brooder equipment or carelessness and lack of attention in regard to good equipment.
- (2) Poor, unwholesome feeds and bad methods of feeding.
- (3) Lack of vigor in chicks due to poor breeding stock, faulty incubation, or injury during shipment from the hatchery.

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\*Poultryman, Utah Agricultural Experiment Station.

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## BETTER CHICKS

When the hatchery delivers to the poultry raiser the full number of lively, vigorous, well-developed chicks from good, well-bred breeding stock it has done all that the raiser has any right to expect. The present all too-common practice on the part of the poultry raiser in blaming the hatchery for every unfavorable condition that develops in his flock is very unfair, both to the poultry raiser and to the hatchery. Under present conditions where poor results are obtained, either in raising the chicks or in getting a good egg record from the pullets that are raised, in nine cases out of ten the cause is due to conditions mentioned in (1) or (2) above stated, and the poultry raiser or his methods, and not the hatchery, is entirely responsible. This condition is unfortunate for the poultry raiser himself, since if he assumed the blame for his trouble he would attempt to locate the cause; when faulty conditions are improved, the trouble usually disappears.

The present practice of buying day-old chicks from the hatchery has completely replaced in many sections the old-time mongrel hen so common on the farm in the past, with uniform flocks of fairly well-bred fowls. Healthy, vigorous chicks depend primarily upon good breeding stock and correct incubation conditions. The better hatcheries are exerting every effort to see that these conditions are met to the last detail. These hatcheries are helping the poultry raisers to realize the value of getting good chicks. The local hatchery offers a great opportunity for developing the breeding business and supplying the poultry raiser with good, vigorous chicks as well as making a better market, during the season of low prices, for eggs from the best flocks in the district where the hatchery is located.

## TIME TO HATCH THE CHICKS

There is no "best time" to hatch chicks for all poultry raisers. The time of hatching and rate of development determine the time of year that the pullets start laying. With good care Leghorn pullets can be well developed and brought into laying condition in five and one-half to six months from hatching. Some poultry raisers take longer than this, while others may take slightly less time. In some cases it is desired that the pullets begin laying in August or September and in others not until October. In case of too early laying or if the pullets start laying when they are small and immature, the pullets often produce well for a few weeks and then go into a winter molt which may take from five to ten weeks, when the price of eggs is highest. If the pullets are large, well-developed, vigorous birds and

begin laying near the middle of September or later, with good care and comfortable housing they can usually be kept in steady laying condition all winter. These, too, may go into a winter molt if production is checked by poor care, by bad housing conditions in severe weather, by abrupt changes in the feed, or by improper methods of feeding.

## BROODING EQUIPMENT

To be successful a brooder house must be clean, dry, well-ventilated, and roomy; the brooder must maintain a uniform temperature. There are several types of brooder houses and brooder stoves that are being used successfully at present. The most expensive equipment is not always the best, and cheap, makeshift equipment often proves very expensive due to heavy losses. Well-planned brooder houses and good, dependable equipment are the first requisites for success.

Everything should be ready and the brooder set up, tested, and regulated to hold a uniform temperature BEFORE the chicks are expected to arrive. Drinking vessels, feed troughs, fuel for stove, feed and all other supplies should be on hand several days in advance of the arrival of the chicks. The chicks should be met at the train. Delays, especially after long shipments, are dangerous. The chicks arrive in warm, insulated shipping boxes, the inside temperature of which is usually around 95° to 100° F. If the brooder house is not warm and comfortable the chicks are easily chilled as they are taken from these boxes.

### THE BROODER STOVE

There are several well-made coal-and oil-burning brooder stoves on the market. As brooder stoves are usually rated, for 300 chicks or less a 500-chick-size stove should be used and for 300 to 700 chicks a 1000-chick-size stove should be used. A good colony brooder stove will keep a uniform temperature by means of a reliable automatic control. It should hold a uniform heat without any particular attention for from six to ten hours. Where these requirements are provided it makes little difference whether the stoves used burn oil, gas, or coal, except for cost of fuel. Electric heaters would be cheapest and best in many cases where the supply of electricity is always assured. However, in case of severe storms when the heat is most needed, the power may be off for several hours causing disastrous results.

In the operation of the brooder the instructions of the manufacturer could be carefully followed. When a heater is used that is



new to the poultry raiser it should be run for three or four days before the chicks arrive so that every detail of its operation may be studied and tested. Where anthracite coal is recommended, this kind of coal is the safest to use.

### PROPER TEMPERATURE

When the chicks are placed in the brooder the temperature should be from 95° to 100° F. and should be held near this point during the first week. The thermometer should be placed at or near the place where the chicks are expected to hover. In the case of the large coal- or oil-burning colony brooder stoves this would be near the floor and about one foot out from the edge of the large galvanized iron heat deflector. After the first week the temperature should be gradually reduced to about 80° to 85° F. during the fourth week. The temperature should be maintained as uniformly as possible. Sudden changes either up or down are injurious to the chicks. If the chicks become chilled they are greatly weakened. This weakening is usually followed by diarrhea and consequent loss. Over-heating is often equally disastrous.

Artificial heat should be continued in the brooder for four to eight weeks, depending on the time of the year and weather conditions. Early-hatched chicks require a longer heated period than late-hatched. The temperature should be gradually reduced to avoid too sudden a change. After the heat is stopped it is advisable to leave the stove in place for a short time. During the next week or two if a cold stormy period develops, a little heat at night may prevent some loss.

### THE BROODER HOUSE

For best results, the brooder house should have two rooms—one which is heated and kept at a uniform temperature, the other unheated, light, dry and well-ventilated, with an open south front to admit sunlight. On cold, stormy days a thin muslin curtain should be used over the open front. There should be a large runway (preferably about 6 inches high and 2 or 3 feet long) in the partition from the cool to the heated room.

The chicks should be kept in the heated room near the stove the first two or three days. After the third day they should be let into the cool room and the feed and drinking vessels placed here for them. After the fourth or fifth day all feeding should be done in this cool room and a clean dry straw litter placed on the floor to keep the chicks

busy. This litter should be changed as often as necessary to keep it clean and dry. The opening between the cool and heated room should always be left open (except at night) to allow the chicks free passage in and out. As the nights get warmer (when the chicks are protected by a good coat of feathers), the opening may be left open day and night. This will aid in ventilation of the brooder room. The ventilation in this room should be carefully watched at all times. It must be kept in mind that the requirements of the chicks for fresh air are constantly increasing, due to rapid growth. The windows or ventilators should not be left open so that a draft will strike the young chicks.

When the chicks are 8 to 14 days old they should be let out of the brooder whenever the weather is favorable. The outside run should be limited for a few days. After the chicks become accustomed to their surroundings they may be given as much range as is available. An orchard with plenty of shade and growing green feed makes an ideal range for growing pullets. The chicks should be allowed to run in and out of the brooder at will. In case of sudden showers the chicks may pile up in partially sheltered corners. This might cause loss, especially if the chicks were locked out of the brooder house.

Where outside runs are used soil contamination must be carefully guarded against. The ideal condition would be to have a sandy well-drained soil and enough land available so that the brooder house could be moved onto a new tract of ground each year. As a result of brooding chicks on the same tract of ground two or more years in succession, round worms and coccidiosis infections are becoming more common and more serious in some sections. Where it is impossible to move the brooder house each year the surface of the ground should be kept as clean and as dry as possible. The chicks should not be allowed to run on damp or wet ground.

#### PLAN OF BROODER HOUSE

The plan shown in Figure 1 gives the arrangement of the stove, perches, feed hoppers, etc. in the heated and cool rooms of a well-arranged brooder. The runway for the chicks from one room to the other is under the door at "A" and is full width of the door and about 6 inches high. This door should be kept closed to hold the heat in the brooding room. The opening at "C" in front of the cool room should be closed in cold stormy weather by the use of a thin muslin curtain. In pleasant weather it should be left open to admit as much sunlight and fresh air as possible. The windows at "D" are for



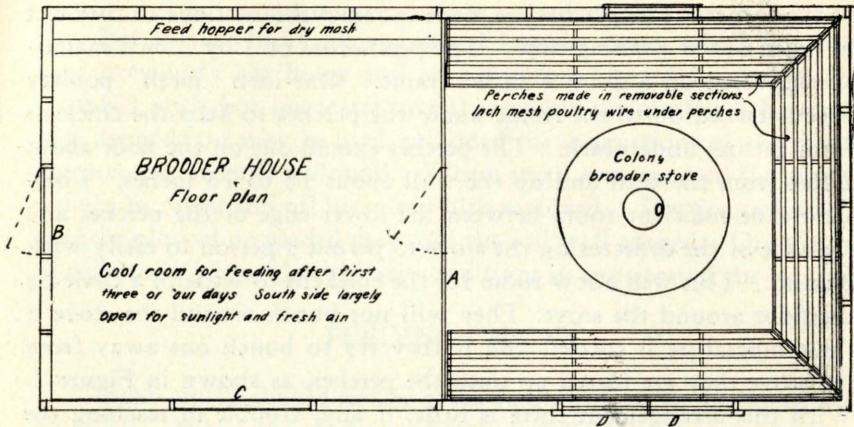


Fig. 1. Plan of brooder house.

ventilation in the brooder room and should be made to open and close. A cement floor or one made of tongued and grooved flooring is very desirable. Either would be much easier to keep clean and sanitary than a dirt floor.

After the first few days there is usually considerable trouble in preventing the chicks from piling up. They usually try to get in a mass as they settle down for the night, and this may result in serious loss. The arrangement of the perches on three sides, as shown, will

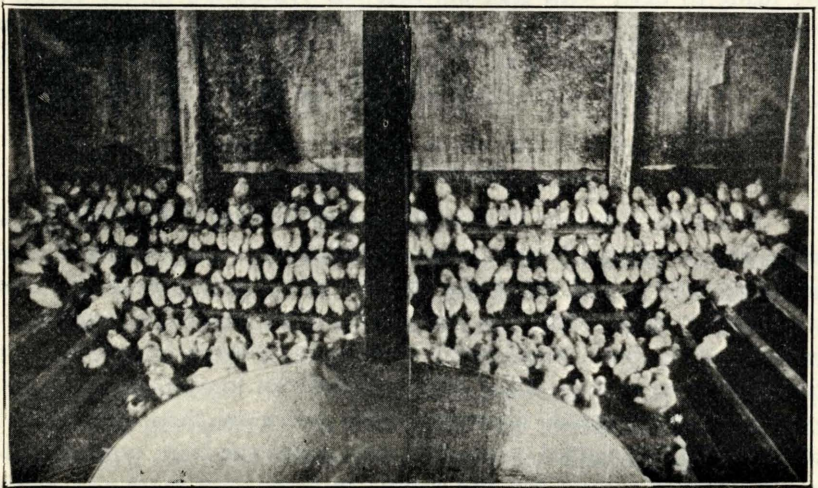


Fig. 2. Showing pullets on perches in brooder house.



aid materially in handling this problem and will keep the chicks out of the corners. The perches are made in removable sections so they can be taken out at cleaning time. The perches are of 1 by 2 inch material supported on a 2 by 2 inch frame. One-inch mesh poultry wire is tacked on to the frame under the perches to keep the chickens from getting underneath. The perches extend out on the floor about 2 feet from the wall and up the wall about 16 to 18 inches. There should be sufficient room between the lower edge of the perches and the edge of the deflector on the stove to permit a person to easily walk around. This will allow room for the chickens to settle in a circle on the floor around the stove. They will not bunch around the stove if the temperature is correct, and if they try to bunch out away from the stove they are forced up onto the perches, as shown in Figure 2. With this arrangement there is little, if any, trouble in teaching the pullets to perch, as they naturally take to the perches when they desire to do so. After the third or fourth week most of the chicks should be on the perches every night.

A section of a semi-monitor house may be made into an excellent brooder house. This section should be from 12 to 20 feet from the east to the west and from 20 to 26 feet from front to back. A temporary partition should be made from the windows in the top to the floor, with a door as shown in Figure 1 at "A". The stove should be placed in the back or high part of the house. The windows in the top give a good distribution of light, and if one or two of them are made to open with transom lifts the ventilation in the brooder room can be controlled for any kind of weather condition. The low section in front would make a good open, sunny feeding room. A shed-roof house or other types may also be used to provide suitable conditions.

#### OVERCROWDING

It is false economy to attempt to save expense in brooder equipment by crowding a large number of chicks into one brooder. Losses are often heavy, and the chicks that are raised are so weakened that they seldom make profitable producers. This practice is usually accompanied by poor ventilation, unsanitary brooder houses, and a contamination of soil—all of which are difficult to control. For best results in raising good, vigorous pullets not more than 600 or 700 chicks should be started in one lot, even under the large type of coal- or oil-burning colony brooder stoves; in some cases more and better pullets would be raised with but 400 or 500 in one lot.

## DISINFECT OLD BROODER

Before the chicks are put into a brooder house which has been used previously the house and all equipment should be cleaned and scrubbed with hot lye water and thoroughly disinfected. Any reliable disinfectant may be used, provided the instructions of the manufacturer are carefully followed. Where small runs are used the ground should be raked and all litter and filth removed. The ground should then be plowed or spaded deep and the soil well turned. One cannot be too careful about the sanitary conditions in and around the brooder.

## FEEDING CHICKS

Baby chicks should not be given feed until 36 to 48 hours after hatching. When the chicks are hatched they are provided with feed which lasts over this period, and too-early feeding may be injurious. When they are received from distant hatcheries they should be put in the brooder and given a light feeding as soon as received.

## SOUR MILK FIRST FEED

As the chicks are put in the brooder they should be placed near the drinking fountains which should be filled with sour skim milk or buttermilk. The beaks of a few of the chicks should be dipped in the milk to start them drinking. Extensive experiments have shown that in addition to being quickly and easily digested, milk has a favorable influence in the control of digestive disorders and in reducing mortality. No water should be given to the chicks the first two or three weeks unless the milk is not available. Where milk is not available hard-boiled eggs may be used at the rate of 2 or 3 eggs a day for each 100 chicks. Infertile eggs from the incubator or culls from the grading plant may be used.

Chicks have a preference for thick sour milk and will consume more of it than if the milk is fed in any other condition. Care should be taken to keep the drinking vessels clean and sanitary. Rancid or dirty milk or dirty drinking fountains may be injurious and cause digestive disorders. Where the milk is produced by the poultry raiser he may be governed by his own particular conditions as to whether the milk is fed sweet from the separator or allowed first to sour. There seems to be little difference in the food value. However, it is advisable to always feed it in the same condition.



## FIRST GRAIN FEED

After the chicks have been given a chance to drink what milk they desire, a light feeding of the following mixture may be given five times daily for the first three days:

Oatmeal	10 lbs.
Bran	5 lbs.
Bone grit (chick size)	8 lbs.

Only as much feed as the chicks will clean up readily should be given. Overfeeding should be avoided, although the feed must be frequent and regular. A light covering of well-cured alfalfa hay leaves may be spread on the floor before the chicks arrive and the floor kept covered with these leaves for the first four or five days. The leaves should then always be kept before the chicks in feed racks or troughs and the floor covered with fine, clean, dry straw. Whether alfalfa leaves or straw is used it should be cleaned out and fresh litter added as soon as it becomes damp or dirty. When bone grit is not available coarse sand or calcite (chick size) may be used; however, bone is preferable.

Beginning with the third or fourth day a mash made of equal parts of bran and ground corn or ground wheat may be kept constantly before the chicks in feed troughs. Bran has a mild laxative effect and is bulky, which aids digestion and helps to satisfy the chick's craving for feed. It is also fairly rich in ash and protein, the bone-and tissue-building nutrients. At this time cracked yellow corn and wheat should be added to the oatmeal to replace the bran and this mixture feed in a light straw litter or on feed trays four or five times daily. The amount should be just what the chicks will clean up readily. The grit should be placed on feed trays and kept before the chicks at all times. The proportion of corn and wheat may be increased gradually and the oatmeal decreased, until in about two weeks the oatmeal may be omitted entirely. The cracked corn and wheat should be fed in the litter two or three times a day. The amount should be limited to that which they will work for industriously and clean up in a short time, except at the evening feed when the chicks should have all they will eat so that every chick settles down for the night with a full crop.

Beginning about the eighth or ninth day a dry mash to take the place of bran, ground corn, or ground wheat should be placed in the feed hoppers; it should be constantly before the chicks. The following mixture is recommended:

## DEVELOPING MASH

Bran.....	200 lbs
Ground corn .....	150 lbs.
Shorts .....	50 lbs.
Meat meal .....	40 lbs.
Charcoal .....	16 lbs.
Bone meal .....	16 lbs.
Fine ground calcite .....	10 lbs.
Fine salt .....	5 lbs.

When milk is not available in sufficient quantity, water should be provided and the amount of meat meal increased in proportion to the amount of milk which is lacking. Where no milk is given the meat meal should be increased to 100 pounds, or better still to 75 pounds of meat meal and 25 pounds of powdered milk. Good, well-cured alfalfa leaves should be fed daily until a regular daily supply of freshly chopped green feed or freshly cut lawn clippings are available.

## SEPARATE COCKERELS AND PULLETS

When the chicks are from 6 to 8 weeks old the cockerels should be separated from the pullets, put in a pen by themselves, and crowded for market by extra feeding. If the weather is warm and pleasant they should not need a heated place. The cockerels develop more rapidly than the pullets, and both will grow better when kept in separate pens. The pullets should not be crowded for rapid growth but should maintain a steady, consistent growth.

## FATTENING COCKERELS

The cockerels may be given a small run or kept in a roomy, dry house, and then crowded for market. They should be given a scratch feed of cracked corn and wheat—all they will clean up in a straw litter twice daily for about two weeks and once a day thereafter. The litter should be kept clean and dry. They should also be given a moist mash in shallow troughs daily for about two weeks, and then twice each day until sent to market. One of these feeds of moist mash may replace the morning scratch feed. A daily supply of fresh-cut green feed, milk, water, grit, and dry mash should be kept constantly before them. Over-feeding the moist mash is often disastrous. The wet mash should be cleaned up in about 30 minutes after being fed. Sour milk is preferable to water in making the moist mash.



## FEEDING PULLETS

When the pullets are 8 weeks old and until mature they can be fed the same mash that is fed to laying hens. The following mashes are used with favorable results in the Utah Station flocks:

### GROWING OR LAYING MASHES

<i>Mash With Corn</i>		<i>Mash Without Corn</i>	
Bran .....	200 lbs.	Bran and shorts .....	200 lbs.
Ground yellow corn .....	200 lbs.	Ground wheat .....	100 lbs.
Shorts .....	100 lbs.	Ground barley .....	100 lbs.
Meat meal .....	50 lbs.	Ground oats .....	100 lbs.
Charcoal .....	15 lbs.	Meat meal .....	50 lbs.
Bone meal .....	10 lbs.	Charcoal .....	15 lbs.
Fine calcite .....	10 lbs.	Bone meal .....	10 lbs.
Fine salt .....	4 lbs.	Fine calcite .....	10 lbs.
		Fine salt .....	4 lbs.

One of these mashes should always be available in the feed hopper. Grit, water, and milk should also be kept constantly before the pullets. Where milk is unavailable, semi-solid buttermilk may be used with good results. Without either of these the meat meal should be increased to 100 pounds, or 80 pounds of meat meal and 20 pounds of dried or powdered milk may be substituted. It is not advisable to crowd pullets with wet mash unless they are slow in coming into laying condition in the fall. At this time a moist mash will often aid in getting the pullets in good laying condition. This should not be used unless the pullets are large, well-developed, and in good flesh.

The scratch feed should be fed in a straw litter morning and evening from 4 to 5 P. M. The amount fed in the evening should be all that the pullets will clean up, while the morning feed should be limited to about one-half the amount fed in the evening. This method of feeding should include a good range with an abundance of growing green feed. Where range is limited it may be necessary to close the dry-mash hoppers a part of each day and keep a heavy supply of dry litter on the floor where the scratch feed is given.

In this discussion of the problems and methods of feeding chicks the aim has been to use as far as possible home-grown and home-mixed feeds. Ready-mixed or commercial chick feeds put out by reliable feed companies may be used, usually with favorable results, where the instructions of the manufacturer are carefully followed. However, these feeds are usually more expensive than the home-mixed feeds.

## VITAMINS NECESSARY

At the present time but three of the vitamins—A, B, and D,—are known to be necessary for growing chicks. While no mention has been made of these important factors they have all been included in the rations and methods of brooding outlined in this publication. The loss of chicks would be very heavy by the time the chicks were 6 or 8 weeks old if any one of these vitamins were missing. The only instances in which there might be trouble from this source would be (1) in brooding winter chicks, (2) during the early spring and late winter months, and (3) during long drawn-out stormy periods when it would be impractical or impossible to get the chicks in direct sunshine.

**Vitamin A** is sometimes called the fat-soluble vitamin. When it is absent from a ration the chicks fail to grow and usually develop eye trouble. The eye and face and side of the head become swollen and filled with pus. Small white pustules usually appear in the back part of the mouth and throat. Small or limited amounts of vitamin A in the ration may make the chicks susceptible to respiratory diseases such as colds, roup, bronchitis, or pneumonia, and may retard development and cause inferior scrubby chicks. The best sources of this vitamin for chickens are fresh succulent green feed, well-cured alfalfa leaves or a good grade of alfalfa leaf meal, yellow corn, and tested cod liver oil.

**Vitamin B** is very necessary for poultry and especially for growing chicks. It is very seldom, if ever, that this food factor is short or missing in the chick or poultry ration. It is abundantly supplied in the whole or cracked grains and in the bran and shorts so commonly fed as important or large parts of the mash. A shortage of this vitamin affects the nerves, and as a result the chicks fail to grow. This trouble is usually called polyneuritis.

**Vitamin D** is a very important factor in feeding growing chicks as they are very susceptible to rickets, commonly called "leg weakness" by the poultry raiser. This difficulty develops readily in chicks when the ration is deficient in bone-building materials or when the chick is unable to use or assimilate these materials through a lack of vitamin D or of direct sunshine. The best known sources of vitamin D are the fish oils, especially cod liver oil and salmon oil, and egg yolks. None of these products is included in the rations given, but the need of direct sunshine for the chicks is strongly emphasized.

Hughes of the Kansas Experiment Station, Hart, Steenbock, and



Halpin of the Wisconsin Experiment Station, and other investigators have demonstrated through carefully planned experiments that direct sunshine or the artificial ultra-violet rays from specially constructed lamps can fully protect the chick against rickets or faulty bone formation when the ration is properly balanced. The use of cod liver oil or of other feeds rich in vitamin D is not necessary in this locality if chicks have access to direct sunshine and are fed plenty of good well-cured alfalfa leaves in connection with a well-balanced ration. Under special conditions the feeding of 1 to 2 per cent of the feed of cod liver oil would be beneficial and often may be necessary when brooding chicks in winter or early spring. Under these conditions it would be advisable to add one quart of cod liver oil to each 100 pounds of feed. The oil should be thoroughly mixed with a small amount of feed. This mixture should be added to and mixed well with the balance of the feed.

To insure a regular supply of this important vitamin some poultry raisers make a practice of feeding cod liver oil in all feeds during the growing period. This adds considerably to the cost of feeding and should not be necessary under Utah conditions where the chicks have access to an abundance of direct sunshine.

Sunlight passing through ordinary window glass is not effective in preventing rickets as the glass filters out the ultra-violet rays. Certain glass substitutes may be used with success to replace the glass in the brooder house, but not to replace the muslin curtain which admits fresh air for ventilation as well as the active rays of the sun.

## SUMMER CARE OF PULLETS

Where the pullets are kept in small runs without some shade or green feed, growth is slow and the birds are usually stunted. If shade is provided during the hot summer days, if a liberal supply of fresh green feed is given daily, and if the runs are kept clean, dry, and sanitary it is possible to produce good vigorous pullets in small runs. Plenty of room in the roosting quarters with good ventilation is also very necessary during the hot summer nights. Fresh lawn-clippings, freshly chopped alfalfa, lettuce, and cabbage are excellent green feeds if given regularly and in liberal amounts. The pullets should be given daily all they will eat. Healthy, vigorous pullets cannot be produced without green feed. The size of the house and runs may have a direct relation to their rate of growth. Lack of fresh air, mites, and lice may also be limiting factors.

## CANNIBALISM

Toe-picking and feather-eating may develop into vicious habits in brooder chicks and result in serious loss. When these vices are first noticed they should be carefully watched. Chicks with bleeding toes or feathers should be removed from the flock. This trouble usually starts early in the brooding period but may not develop until later. It may be caused by poor feeding and a craving for something the birds are not getting in their food. However, the most common causes are over-crowding, lack of exercise, and not keeping the chicks busy. The remedy is to remove the cause. As soon as this trouble is noticed the litter on the floor should be increased and the chicks turned out into the runs whenever the weather is at all favorable. Cannibalistic habits among the layers during the winter often starts with toe-picking or feather-eating earlier in the life of the chick.

## CLEANLINESS IMPORTANT

Too great emphasis cannot be placed on the importance of cleanliness and sanitation in and around the brooder. Not only the building but all equipment should be thoroughly cleaned and disinfected before the chicks are placed in the brooder. The drinking vessels, especially those in which milk is fed, should be cleaned regularly and sterilized by boiling at least once a week. Where this is not done and thick, rancid milk is allowed to accumulate in the seams and corners of the feeding vessels, heavy loss may result due to bacterial decomposition of these food residues.

Moldy feeds and sour, wet feeds should never be fed to young chicks. Wet feeds may sour and spoil in a short time in the brooder due to the high temperature. For this reason it is better to feed nothing but dry feeds during the first four or five weeks.

A small continuous stream of water coming into the runs or other wet places for the chicks to scratch and feed in is often a source of considerable trouble and makes an ideal place for the spread of round worms and coccidiosis, a protozoan infection of the intestinal tract, both of which may cause serious loss in a flock of young chicks. The danger of infection on dry, well-drained soil is not nearly so great.

## MITES AND LICE

Where the brooder is kept clean and the older fowls are kept away from it there is little danger from mites and lice early in the



brooding period. These pests are often introduced later and are a serious handicap to the developing pullets.

Where the flock is unthrifty or developing slowly, it is advisable to look closely for these pests and especially for mites. They are usually found on the underside of the perches or in protected places near where the pullets are roosting. A mixture of equal parts of kerosene and old oil from the crank case of an automobile, used freely wherever the mites are found, is an excellent remedy. This oil may be sprayed or applied with a brush, but should be worked into all cracks and corners.

Lice remain on the bodies of the fowls, and it is necessary to treat the pullets for this pest when they are found. Treating each pullet with sodium fluoride or by working a small amount of blue ointment well into the feathers on the abdomen just below the vent are very effective in controlling this pest. With proper care there is little danger of this pest getting started in brooder chicks until the pullets mix with the older fowls.

Where chicks are brooded with hens they are usually infected with lice very early. Where lice are found on young chicks, smearing a small amount of lard over the back of the head and neck and under the wings is perhaps the safest and best means of control. The hen should be thoroughly treated for lice before the chicks are put with her.

### LEGHORNS EASILY CONFINED

If small, active, nervous fowls are permitted to develop the habit of flying while young, it is almost impossible to keep them in any kind of yard. They can fly over fences 8 to 10 feet high and can readily do so. If this habit is prevented from the start a fence at least 5 feet high will keep them in the yard.

When the chicks first begin to fly (when about 6 to 8 weeks old), they should be run through a catching crate to separate the cockerels and pullets. The flight feathers on one wing of the pullets are clipped at this time. Care should be taken not to clip the feathers too short and thus cause bleeding. When about 4½ months old the pullets molt and develop a new coat of feathers; the flight feathers of one wing are again clipped. With this practice the pullets grow and develop with the idea that they cannot fly, and the habit of flying over fences does not later develop.